Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

A THEOREM IN NUMBER THEORY CONNECTED WITH THE BINOMIAL FORMULA.

By D. N. LEHMER, University of California.

The theorem is: *In the expansion of* $(P+Q)^n$, *where* P *and* Q *as well as* n *are integers, there will be a pair of consecutive equal terms when, and only when,* $n \equiv -1 \bmod (P+Q)/\delta$, *where* δ *is the greatest common divisor of* P *and* Q.

Equating two consecutive terms we have

$$\frac{n(n-1)(n-2)(n-3)\cdots(n-k)}{(k+1)!}P^{n-k-1}Q^{k+1} = \frac{n(n-1)(n-2)\cdots(n-k-1)}{(k+2)!}P^{n-k-2}Q^{k+2}.$$

Cancelling and multiplying across,

$$P(k+2) = (n-k-1)Q.$$

If now $P = \delta P'$ and $Q = \delta Q'$ where P' and Q' are relatively prime,

$$P'(k+2) = (n-k-1)Q',$$

whence

$$nQ' = 2P' + Q' + k(P'+Q')$$

or

$$(n+1)Q' \equiv 2(P'+Q') \bmod (P'+Q'),$$

that is

$$(n+1)Q' \equiv 0 \bmod (P'+Q'),$$

and since Q' is prime to $P'+Q'$,

$$n+1 \equiv 0 \bmod (P'+Q').$$

That is

$$n \equiv -1 \bmod (P+Q)/\delta.$$

More generally if $n \equiv -1 \bmod (P+Q)/\delta$ there will be two consecutive terms in the expansion having the ratio β/α, δ being the greatest common divisor of αP and βQ.

AN APPLICATION OF PARTIAL DERIVATIVES TO THE ELLIPSE.

By M. O. TRIPP, Yonkers, N. Y.

The object of this article is to show how we may make use of partial derivatives in graphing and discussing the properties of a given ellipse.

Let us take the equation of an ellipse, in rectangular coördinates, in the general form

$$f(x, y) = ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0, \quad (h^2 - ab < 0),$$